

CLAIMS

1. A method for diagnosis of ignition system faults in an internal combustion engine of a type that includes an ignition system that includes at least two ignition coils, each of the ignition coils having a primary connector that connects to a cylinder pair, the method comprising the steps of:

consecutively disconnecting and reconnecting the primary connector for each coil that connects to a cylinder pair;

when a single primary connector is disconnected, determining whether misfiring or roughness declines, thereby identifying a faulty cylinder pair;

for each cylinder of the identified faulty cylinder pair, measuring a firing line voltage for each accessible spark plug wire connected to the identified faulty cylinder pair; and

identifying a faulty cylinder based on a measured abnormal firing line voltage.

2. The method as recited in Claim 1 wherein the engine is a four-cylinder engine.

3. The method as recited in Claim 1 further comprising the steps of:

prior to the disconnecting step, determining a firing order for the cylinders of the engine and the position of the first firing cylinder; and

identifying cylinder pairs based on the connection of two cylinders to the same primary connector.

4. The method as recited in Claim 1, wherein the engine has a number of cylinders that is selected from the group consisting of four, six, eight, ten, twelve and sixteen.

5. The method as recited in Claim 1 further comprising the steps of:

prior to the step of determining whether the misfiring or roughness declines when the primary connector is disconnected, determining whether idle speed of the vehicle is lower than fast idle speed before one of the primary connectors is disconnected;

if the idle speed is lower than fast idle speed, increasing the idle speed of the vehicle such that the idle speed of the vehicle is at fast idle speed.

6. The method as recited in Claim 5, wherein the restoring step comprises inserting a shim into linkage that controls fuel flow.
7. The method as recited in Claim 1, wherein the ignition coil is configured as a coil over plug assembly having a single accessible spark plug wire.
8. The method as recited in Claim 1, wherein each ignition coil of the ignition system includes two outputs, each of said outputs being connected to spark plugs for two cylinders.
9. The method as recited in Claim 1, wherein the step of identifying a faulty cylinder based on a measured abnormal firing line voltage firing line voltage includes the step of:

displaying the abnormal firing line voltage as part of a waveform.